BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 2 of the Commission's	)	
Rules to Allocate Spectrum Below 3 GHz	)	ET Docket No. 00-258
For Mobile and Fixed Services to Support	)	
The Introduction of New Advanced Wireless	)	
Services, Including Third Generation	)	
Systems	)	

To: The Commission

REPLY COMMENTS OF ARRAYCOMM, LLC

ArrayComm, LLC (hereinafter "ArrayComm") is pleased to submit the following Reply Comments to the Fifth Notice of Proposed Rule Making in the above-entitled matter.

I. ArrayComm's Interest

For more than a decade, ArrayComm has participated in Commission proceedings[1] that involved the allocation and/or reallocation of spectrum for new and advanced services, including Advanced Wireless Services ("AWS"). In fact, in 2001 ArrayComm filed Comments[2] in Docket No. 00-258, which this Fifth Notice of Proposed Rule Making is a continuance thereof.

Our consistent and continuous involvement reflects the importance of spectrum to our company. Innovation in wireless communications cannot be brought to fruition without spectrum. We appreciate the fact that the Commission has acknowledged the potential of TDD technology, its need for spectrum and has recognized ArrayComm as its leading adherent.[3]

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[1] See Comments of ArrayComm filed in Docket No. 90-314, dated 8/16/94.
[2] See Comments by ArrayComm filed in Docket No. 00-258, dated 10/22/01.
[3] See paragraph 8 of the Commission's Notice in this Docket and its referenced footnote 33.

ArrayComm urges the Commission to continue to direct its attention to how to provide for the entrance of new technology, in particular, using the TDD methodology. The Comments in this proceeding are preoccupied with the costs and schemes to be utilized in the relocation of existing broadband and fixed users to alternative spectrum. These considerations are important, but so is the question of how to optimize the use of the spectrum that will exist when the relocation has been effected. Provisions must be made for the next generation of spectrally efficient mobile broadband wide-area systems that operate in unpaired spectrum, such as ArrayComm's iBurst system and future systems based on the newly approved IEEE 802.16e (also known as WiMAX) standard. Spectrum in the 2155-2175 MHz band is one of the few opportunities below 3 GHz.

In all of its previous submissions, ArrayComm has conveyed a consistent message:

1. The Commission should adopt a position of technological neutrality. At the most basic level, this means that any proposal that meets the Commission's technical rules for RF safety and coexistence and would advance wireless mobile communications should be afforded a reasonable opportunity to access spectrum. In ArrayComm's view, such neutrality requires that the Commission's auctions be structured so that TDD systems would be treated on equal footing with FDD systems.

ArrayComm believes that TDD technologies operating in unpaired spectrum will permit the provision of mobile broadband services that will far exceed the data rate of any third generation mobile service envisioned for the foreseeable future and at a cost competitive with today's fixed dial-up data services. We believe that there are valid public interest benefits to be realized by an appropriate allocation of spectrum for TDD systems.

When needed to support deployments in adjacent spectrum bands, both FDD and TDD interests should work together to develop technical and operational requirements that will enable the public to reap the benefits of both technologies. A common goal of accommodating both technologies should prevail. The Commission needs to exert its leadership to assure that the spectrum is allocated for maximum benefit, not merely to those that have the loudest voices. Although the Commission has made positive strides in its attempts to treat both equally, its proposals still emphasize paired spectrum. As the proceedings to reallocate spectrum below 3 GHz for advanced wireless systems draw to a close, the opportunities for rectification become fewer and fewer. ArrayComm urges the Commission to bring together the proponents of TDD and FDD technologies to develop technical and operational requirements, some but not necessarily all of which may need to be implemented in the FCC's regulations, enabling both to flourish and to provide their particular benefits to the public. Absent such action by the FCC, spectrum use by FDD-based technologies will continue to proliferate, occupying channels that could be used by TDD mobile technologies. Because TDD technologies have demonstrated the ability to meet the cost and performance parameters necessary to offer mobile broadband services to consumers, these technologies offer an alternative to broadband services offered by telephone and cable television companies and must not be overlooked by the Commission.

2. The Commission has an obligation to encourage and promote innovation of new technology. TDD systems providing wide area mobile broadband services including WiMAX and HC-SDMA[4] (The ANSI Standardized version of ArrayComm's iBurst system) are now being developed and deployed by manufacturers worldwide. ArrayComm has been active in

[4] HC-SDMA is the acronym for the ANSI Standardized version of the iBurst air interface. The official designation for the standard is "ANSI ATIS 0700004-2005 High Capacity-Spatial Division Multiple Access."

launching its iBurst systems which deploy TDD technology internationally.[5] Based upon these experiences, we know that TDD systems provide commercially viable means for deploying wide-area networks that offer mobile broadband wireless access service. In fact, data rates observed in these deployments exceed those seen in systems based on standards referred to as IMT-2000 (or 3G). They are superior to the rates projected by other carriers to be reached several years in the future. They not only perform to a high standard, they do so with a high level of spectrum efficiency.

ArrayComm has also been active in the IEEE 802.16 standards effort and in the WiMAX Forum Mobile Task Group (MTG) for IEEE 802.16e. MTG's task has been to develop solutions that provide operators with the best possible user data rates, call range and network capacity for mobile WiMAX. By combining MIMO (multiple-input, multiple-output) to increase data rates with AAS (adaptive or smart antenna systems) which improve cell-edge link budgets, manage interference and maximize overall network capacity, the WiMAX community has selected a system architecture that yields significant performance advantages.

ArrayComm and its partners are creating products that will benefit WiMAX operators, user terminal device manufacturers and end-users. Service rates will be faster; costs lower. Wireless coverage and capacity will be improved. WiMAX's status as a viable, mass-market broadband technology will be greatly enhanced. As a final plus, spectrum suitable for iBurst would also be suitable for WiMAX or any other modern wide-area mobile TDD system.

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[5] See II, *infra*

II. TDD is a reality...iBurst in action

There is growing interest in the compelling economic and spectrum management advantages of spectrally efficient wide-area TDD systems in both developing and developed markets.

For example, in Australia, the iBurst network provides quality, full mobility, high speed access both inside and outside buildings across urban and suburban areas of all the major capital cities. Currently, the iBurst system covers Sydney, Brisbane, the Gold Coast, Melbourne, and Canberra. This is achieved with fewer than 80 deployed iBurst base stations and in only 5 MHz of spectrum. Ultimately, the system will reach 75% of the Australian population and 90% of businesses. In South Africa, with a 10 MHz license, iBurst currently covers Johannesburg, Cape Town, Durban, Gauteng, and Praetoria and will reach more than 80% of South African cities when the network is complete. All of these deployments were achieved with significantly less expense and realized significantly higher performance than competing FDD alternatives. Efforts are underway to support deployments of spectrally efficient TDD systems in numerous other markets around the world. In ArrayComm's opinion, the examples above provide compelling evidence that similar deployments could enjoy comparable success in the United States.

III. Importance of this Proceeding

As stated earlier, the reallocation of spectrum below 3 GHz appears to be winding down. The availability of unpaired spectrum below 3 GHz, which was never plentiful, is also dwindling. In the Eighth Report and Order phase of this Docket, the Commission notes in paragraph 8:

> Our proposal to designate the 2155-2175 MHz band for new and advanced services – has generated considerable support, as commenters indicate that band could be best used to promote new technologies, such as AWS in paired or unpaired configurations.

The Commission in footnotes 33 and 34 cites ArrayComm as the promoter of unpaired usage and CTIA as suggesting asymmetrical pairing with "smaller blocks" in the 1710-1755 MHz band.

The Commission concludes in paragraph 10 that it has only decided in this Report and Order to extend the AWS designation to encompass 2110 to 2180 MHz and that how to assign 2155-2175 will be the subject of a "separate service rules proceeding at a later date." We assume that the Notice of Proposed Rule Making that follows immediately after is NOT that separate proceeding.

If so, well and good. The Commission may be assured that ArrayComm will be an active participant in any such proceeding. We note with concern, however, that in terms of feasibility the Commission seems to be affording equal weight to the proposed FDD proposal to pair unspecified portions of 1710-1755 MHz with 2155-2175 MHz, of both a variable nature and at least 445 MHz away, with that of ArrayComm. We have four principal concerns with a plan that permits any FDD use of the 2155-2175 MHz band.

We believe that first and foremost, that TDD systems are superior for handling asymmetric data which is generally acknowledged to typify consumer broadband services. With FDD systems, achievable service asymmetry is shaped years in advance by regulators' allocation decisions. With TDD systems, there is no allocation issue; asymmetry is a design parameter in an operator's network plan. Moreover, the utility of an asymmetric FDD allocation in this case is limited to those service providers who would be licensed to operate in the paired 1710-1755/2110-2155 MHz bands. The use of the 2155-2175 MHz spectrum as an 'auxiliary band' is in effect a carve-out solely for operators licensed in the lower band, having the affect of limiting competition and further reducing the availability of spectrum for new entrants, including would-be TDD operators.

Second, the Commission should consider that 2155-2175 MHz is only 20 MHz wide and is thus a rather small allocation, particularly as compared with more than the 250 MHz of CMRS spectrum available to FDD operators. Unless the Commission is willing to consider nationwide licenses, which is doubtful and which we are not promoting in our comments, would-be FDD and TDD licensees will compete on a market-by-market basis for the allocation. The ability of TDD operators to access the spectrum on a nationwide basis (either directly or through roaming agreements) in order to stitch together a nationwide service offering would be limited, placing them at a further disadvantage to the FDD "establishment."

Third, it should be noted that there are other technological approaches to increasing the downlink capacity and data rates of FDD systems that do not require allocating yet more spectrum to FDD licensees. The ITU-R recommends "that adaptive antenna technology should be considered in the development of new radio interfaces and in the further enhancement of existing radio interfaces to increase spectral efficiency and improve spectral utilization."[6] The underlying problem that FDD operators are attempting to solve with their proposal is the relatively low spectral efficiency of their FDD systems, which limits their ability to support higher data rates in limited spectrum. These FDD operators could, and the Commission should encourage them, to deploy newer technologies that can make dramatic improvements in the spectral efficiency of their FDD systems.

The above reasons should be compelling to justify the availability of this band for TDD systems solely. To add icing on the cake, we would direct the Commission's attention to the experimental nature of the carriers' proposed approach to use the band for asymmetrical pairing

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[6] RECOMMENDATION ITU-R M.1678, Adaptive antennas for mobile systems

in FDD systems. Unlike the numerous examples that can be cited of commercially operating TDD systems, there are no commercial examples of FDD systems operating with this type of proposed asymmetrical spectrum pairing. Those proposing this use of the 2155-2175 MHz band are asking the FCC to adopt a "field of dreams" approach to spectrum allocations, presuming that such systems will be built if spectrum is carved out for them. As such, we discourage licensing the 2155-2175 MHz band for use by systems that don't yet exist. Those licensees should be encouraged to make timely use of this spectrum rather than setting it aside to address future demand or to accommodate future technologies while in effect limiting competition by their actions.

We discourage accommodating both FDD and TDD operation in this small 20 MHz allocation, and we urge to the Commission to take into consideration the results of recent technical studies on mitigating interference between these systems operating in adjacent spectrum bands. While the ability of different types of systems to coexist in adjacent spectrum bands is not as remote as it was deemed to be in the past, it still presents significant practical issues for deployment. In fact there seems to be general agreement that mitigation techniques exist to allow FDD and TDD systems, with appropriate safeguards, to co-exist in adjacent frequency bands and/or in adjacent geographical areas. Recent studies have been conducted that demonstrate the relative effectiveness of various techniques and how much spectrum-sharing is feasible with and without their use. Coexistence between adjacent band TDD systems may be easily achieved through synchronization of their uplink and downlink transmissions, for example. Careful site design and operator coordination similar to that performed by PCS operators today can minimize the size of guard bands necessary for coexistence of dissimilar systems. These techniques are useful for minimizing the size of guard bands between FDD and TDD systems, between adjacent

TDD systems with dissimilar frame structures, and for minimizing the required guard band between the uplink and downlink of FDD systems

The ground rules proposed to govern the auction in this future rulemaking will determine *ab initio* whether innovation will have a chance to prevail over the status quo.

Respectfully Submitted,

By: /s/

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